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EXAMINER

NGUYEN, LAM S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/646,847

Applicant(s)

MASUDA ET AL.

Examiner

LAM S. NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05/11/05 (RCE) and 11/19/04 (amendment).
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 and 15-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-9, 15-20, 22, 24 and 25 is/are rejected.
- 7) ☒ Claim(s) 6, 21, 23 and 26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 10/059,440.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

The indicated allowability of claim 7 is withdrawn because the claim is indefinite as explained in the following rejection.

#### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

*The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.*

1. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim fails to define how the detection resistance connects to the internal resistance and the diode in order to divide the reference voltage.
2. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim fails to define how the internal resistance is used to adjust the voltage generated in the printing apparatus.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

3. Claims 1, 3-5, 18, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imanaka et al. (US 6116714) in view of Schantz (EP 0642925 A2).

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Imanaka et al. disclose a printing apparatus (a thermal ink jet printer) which performs printing by moving a carriage unit (*FIG. 15*), capable of holding a printhead having a plurality of heater resistances (*FIG. 8, element 901*), over a print medium based on information transmitted by an external apparatus (*FIG. 16: The information is transmitted to the printing apparatus from an external device through the interface 1700*), comprising:

reception means (*FIG. 1, element 10*) for receiving an information signal, related to a property of the heater resistances, transmitted from the printhead (*FIG. 1, element 12, column 2, lines 38-41: The heater resistances in a heater board 1000 (FIG. 4) are identical but different in value to the heater resistances in other heater boards. The rank detecting resistor RH or the resistor monitor 914 (FIG. 12) is provided on each heater board 1000 having the resistance value identical to the one of the heater resistances in the same heater board. Therefore, by sensing the resistance value of the RH or the resistor monitor, the reception means 10 knows the information relating to the property of the heater resistances*); and

a voltage control unit (*FIG. 1, elements 7, 9*) for generating a driving voltage generated in the printing apparatus to drive the printhead based on the information signal received by said reception means (*column 3, lines 45-50*).

Imanaka et al. do not disclose wherein said voltage control unit is provided on the carriage unit.

Schantz discloses a printer that performs printing by scanning a carriage unit (*FIG. 3, element 48*), capable of holding an ink jet printhead (*FIG. 3, element 50 and FIG. 1a-b*) over a print medium, wherein the carriage unit comprises a voltage control unit for controlling the

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printhead (*in term of "power-conditioning circuitry" (Abstract)*) for regulating the power provided to nozzle resistors (*column 3, line 39-47*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the carriage unit in the printing apparatus disclosed by Stephenson et al. such that providing the voltage control unit for controlling the printhead on the carriage unit as disclosed by Schantz. The motivation of doing so is to avoid a high peak current transmission between a stationary device and a scanning print device in order to avoid the electrical fault caused by the flow of the high current in the connection as taught by Schantz (*column 3, line 57 to column 4, line 2*).

**Imanaka et al. also discloses the following claimed invention:**

**Referring to claim 3:** wherein the information signal includes an identification signal for identifying a type of the printhead, and said voltage generation means controls the driving voltage in accordance with the identification signal (*FIG. 1, element 12, column 2, lines 38-41: Since the rank detecting resistor RH or the resistor monitor 914 (FIG. 12) has the resistance value identical to the one of the heater resistances, by sensing the resistance value of the RH or the resistor monitor, the reception means 10 knows if the printhead is in a thermal type*).

**Referring to claims 4-5:** wherein the information signal includes a signal indicative of a variation of a plurality of heater resistances provided in the printhead or temperature data of the printhead, and said voltage control unit controls the voltage in accordance with the signal (*column 3, lines 45-50*).

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**Referring to claim 19:** further comprising a main board for controlling the printing apparatus, wherein said voltage control unit adjusts the voltage outputted from said main board (*FIG. 1, 16*).

**Referring to claim 20:** said printhead comprising a switching device for controlling each of the plurality of heater resistances (*FIG. 8, element 902*), wherein said detection resistance is manufactured by the same semiconductor deposition process as the heater resistances (*column 6, line 66 to column 7, line 3*). *(In addition, because claim 20 is an apparatus claim, the above limitation that claims a method of manufacturing the detection resistance is considered but not given patentability weight).*

4. Claims 2, 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imanaka et al. (US 6116714) in view of Schantz (EP 0642925 A2), as applied to claims 1, and further in view of Stephenson et al. (US 5053790).

Imanaka et al., as modified, disclose the claimed invention as discussed above except wherein said voltage control unit is a DC/DC converter which transforms a DC voltage to be applied to the printhead into a value appropriate for driving a mounted head (**Referring to claim 2**) and the printing apparatus comprises a heat source number detection means detects the number of plurality of heat sources driven simultaneously based on an image data signal (**Referring to claims 15-17**).

Stephenson et al. disclose a printing apparatus having a printhead (*FIG. 5, element 26*) comprising a plurality of heater resistances (*FIG. 5, element 534*) and a control unit for controlling a power voltage supplying to the printhead based on an information received from a detection element 506 of the printhead (*FIG. 5, element 310*), wherein the control unit is a

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DC/DC converter (*FIG. 5, element 513*) which transforms a DC voltage to be applied to the printhead into an appropriate value. The printing apparatus also comprises a heat source number detection means (*FIG. 7, element 310*) detects the number of plurality of heat sources driven simultaneously based on an image data signal (*FIG. 7, element 730 and Abstract*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the head voltage controller or the driving signal controller in the printing apparatus disclosed by Imanaka et al., as modified, such that the controller is a DC/DC converter which transforms a DC voltage to be applied to the printhead into an appropriate value for driving the head and comprising comprises a heat source number detection means detects the number of plurality of heat sources driven simultaneously based on an image data signal as disclosed by Stephenson et al. The motivation of doing so is to maintain a prescribed voltage across the selected heat elements that is substantially constant independent of the number of selected heat elements as taught by Stephenson et al. (*Abstract*).

5. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imanaka et al. (US 6116714) in view of Schantz (EP 0642925 A2), as applied to claim 1, and further in view of Stephenson et al. (US 5053790) and Dunn (US 4982199).

Imanaka et al., as modified, discloses the claimed invention as discussed above except a heat source number detection means for detecting a number of plurality of heat sources driven simultaneously, wherein said voltage control unit adjusts a voltage outputted to the head sources based on a signal outputted from said heat source number detection means, and the printing apparatus comprises a heat source number detection means detects the number of plurality of heat sources driven simultaneously based on an image data signal (**Referring to claim 9**).

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Stephenson et al. disclose a printing apparatus having a heat source number detection means (*FIG. 7, element 310*) that detects the number of plurality of heat sources driven simultaneously based on an image data signal and a drive voltage is controlled based on the signal outputted from the heat source number detection means (*FIG. 7, element 730 and Abstract*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing apparatus disclosed by Imanaka et al., as modified, such that comprising the heat source number detection means detects the number of plurality of heat sources driven simultaneously based on an image data signal as disclosed by Stephenson et al. The motivation of doing so is to maintain a prescribed voltage across the selected heat elements that is substantially constant independent of the number of selected heat elements as taught by Stephenson et al. (*Abstract*).

In addition, Imanaka et al., as modified, do not disclose driving pulse generation means for generating a pulse train which drives the plurality of heat sources.

Dunn discloses a thermal ink jet printer having driving pulse generation means for generating a pulse train which drives the plurality of heat sources (*FIG. 2 and FIG. 3A-G*) to control the volume of droplets by varying the pulse train thereby effecting gray scale printing (*column 2, line 10-14*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing apparatus disclosed by Imanaka et al., as modified, such that including driving pulse generation means for generating a pulse train which drives the plurality of heat sources as disclosed by Dunn. The motivation of doing so is to control



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the volume of droplets by varying the pulse train thereby effecting gray scale printing as taught by Dunn (column 2, line 10-14).

6. Claims 22, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imanaka et al. (US 6116714) in view of Schantz (EP 0642925 A2) and Chung (US 5831643).

*(Note: For the rejections regarding to claims 24-25, please see the rejections regarding to claims 19-20, respectively).*

Imanaka et al. and Schantz disclose the claimed invention as discussed in the third rejection except wherein the internal resistance and said resistance are connected in series and said voltage generation means adjusts the voltage generated in the printing apparatus based on a voltage divided by the internal resistance and said resistance.

Chung discloses a circuit in an ink jet printing apparatus for controlling the voltage of driving signals based on a detection signal (*FIG. 5*), wherein an internal resistance (*FIG. 5, element R3*) is in serial connection with a detection resistance (*FIG. 5, element 21*) in order to divide a voltage provided to a comparator to adjust the voltage of the driving signals to drive a heating element (*FIG. 5, element 22*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify the control circuit disclosed by Imanaka et al. to include the internal resistance connected in series with the detection resistance to provide a divided voltage as an input of the voltage controller to adjust the driving signal as disclosed by Chung because it is a common configuration well known in the art of detecting or sensing circuits for controlling purposes.

***Allowable Subject Matter***

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7. Claims 6, 21, 23, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Referring to claims 6 and 23:** The primary reasons for the indication of the allowability of the claims is the inclusions therein, in combination as currently claimed, of the limitation that wherein said voltage generation means compares a reference voltage, divided by the internal resistance, detection resistance provided inside the printhead, with **a driving voltage which drives the printhead**, then controls the driving voltage so as to cancel an error in these voltages is neither disclosed nor taught by the cited prior art of record, alone or in combination.

**Referring to claims 21 and 26:** The primary reasons for the indication of the allowability of the claims is the inclusions therein, in combination as currently claimed, of the limitation that a PWM controller for controlling a pulse signal inputted into said voltage converter in order to adjust the voltage provided by said voltage converter and a comparison circuit for comparing the first divided voltage with the second divided voltage, and outputting the comparison result to said PWM controller is neither disclosed nor taught by the cited prior art of record, alone or in combination.

### ***Response to Arguments***

Applicant's arguments filed 11/29/2004 have been fully considered but they are not persuasive.

The applicants argued that Imanaka et al. and Schantz fail to disclose “*at least a voltage control unit for adjusting a voltage generated in a printing apparatus, with the voltage unit being provided on a carriage unit*”. The examiner does not agree with the above argument. First of all,

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as shown in FIG. 1 and column 6, lines 49-51, Imanaka teaches a voltage controller 9 which controls/adjusts the driving voltage of the printhead in accordance to the value of the heater RH obtained by the head data detector 10 (*column 7, lines 5-12*). Secondly, Schantz discloses a concept that locating a voltage controller for regulating/adjusting a voltage driving a printhead in the printhead structure (carried by the carriage unit 48) in order to free the scanning printhead from restrictive cables that link the printhead to a stationary circuit (*Abstract*). Therefore, the motivation to combine Imanaka et al. and Schantz is well established to avoid electrical connections between a moving printhead and a stationary device (*column 3, line 56 to column 4, line 2*).

### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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